

PRECISION, ERROR, & ACCURACY

1. A student measures the acceleration due to gravity and finds it to be 9.72 m/s^2 . What is his percentage error (or percentage deviation), if the accepted value is 9.81 m/s^2 ?
2. When determining Planck's constant, a student's measurements produce values of $5.78 \times 10^{-34} \text{ J}\cdot\text{s}$ & $7.29 \times 10^{-34} \text{ J}\cdot\text{s}$. If the accepted value is $6.63 \times 10^{-34} \text{ J}\cdot\text{s}$, what is
 - (a) the percentage difference for the measured values?
 - (b) the percentage error for each value?

ROUNDING, SCIENTIFIC NOTATION, & SIGNIFICANT DIGITS

3. State the number of significant digits in each of the following.

| | | |
|-----------|------------|----------------------|
| (a) 908 | (b) 70.600 | (c) 0.0050 |
| (d) 0.010 | (e) 760 | (f) 0.000 000 000 69 |
4. Express each of the following in scientific notation.

| | | |
|-----------------------|---------------|-------------------|
| (a) 6807 | (b) 0.000 053 | (c) 5200 |
| (d) 0.000 000 000 813 | (e) 6.8 | (f) 4 000 000 000 |
5. Express each of the following in common notation.

| | | |
|---------------------------|--------------------------|----------------------------|
| (a) 7×10^1 | (b) 5.2×10^3 | (c) 8.3×10^9 |
| (d) 10.1×10^{-2} | (e) 6.3868×10^3 | (f) 4.086×10^{-3} |
6. Perform the following mathematical operations, expressing the answers to the correct number of significant digits.

| | | |
|----------------------------|--------------------------|--------------------|
| (a) $463.66 + 29.2 + 0.17$ | (b) $426.66 - 39.2$ | (c) $(2.6)(42.2)$ |
| (d) $(65)(0.041)(325)$ | (e) $(0.0060)(26)(55.1)$ | (f) $650 \div 4.0$ |
| (g) $0.452 \div 0.012$ | (h) 3.5^2 | (i) $\sqrt{4.9}$ |
7. If a gold atom is considered to be a cube with sides $2.5 \times 10^{-9} \text{ m}$, how many gold atoms could stack on top of one another in a piece of gold foil with a thickness of $1.0 \times 10^{-7} \text{ m}$?
8. On the average, 1.0 kg of aluminum consists of 2.2×10^{25} atoms. How many atoms would there be in a block of aluminum 10 cm by 1.2 cm by 15.6 cm , if the density of aluminum is 2.7 g/cm^3 , or $2.7 \times 10^3 \text{ kg/m}^3$?
9. There are approximately 1.0×10^{11} stars in our galaxy. If the average mass of a star and its planets is $2.0 \times 10^{30} \text{ kg}$, what is the approximate mass of our galaxy?
10. Electric current flows through a conductor at a rate of 2.50 C/s . If a coulomb is composed of 6.24×10^{18} electrons, how many electrons will flow through the conductor in 10.0 min ?

ANSWERS

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|---|--|-------------------------------------|
| 1. 0.917% | 5. (a) 70 (b) 5200 (c) 8 300 000 000 (d) 0.101 (e) 6386.8 (f) 0.004 086 | 7. 4.0×10^1 atoms |
| 2. (a) 23.1% (b) 12.8%, 9.95% | | 8. 1.1×10^{25} atoms |
| 3. (a) 3 (b) 5 (c) 2 (d) 2 (e) 2 (f) 2 | | 9. $2.0 \times 10^{41} \text{ kg}$ |
| 4. (a) 6.807×10^3 (b) 5.3×10^{-5} (c) 5.2×10^3 (d) 8.13×10^{-10} (e) 6.8×10^0 (f) 4×10^9 | 6. (a) 493.0 (b) 387.5 (c) 1.1×10^2 (110) (d) 8.7×10^2 (870) (e) 8.6 (f) 1.6×10^2 (160) (g) 38 (h) 12 (i) 2.2 | 10. 9.36×10^{21} electrons |